

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all previous versions and listings of claims in this application.

Claim Listing:

1. (Currently Amended) A data segmentation method in a telecommunications system, comprising:

segmenting larger data units of a higher layer into smaller protocol data units of a lower layer so that ~~each~~ at least one of the lower layer protocol data unit includes ~~one~~ two or more data segments each ~~containing data from a~~ two or more different ~~one of the~~ higher layer data units;

~~providing each lower layer protocol data unit that contains two or more data segments from two or more different higher layer data units, with segmentation length information which otherwise indicates length of the data segments;~~

indicating with predetermined values of ~~the~~ segmentation length information, special information about the higher layer data units, instead of the length of the segments that would be indicated by other values of the segmentation information, at least in each lower layer protocol data that contains two or more data segments from two or more different higher layer data units; and

transmitting the lower level protocol data units to a receiving end; wherein the segmented higher layer data unit can be assembled at the receiving end by means of the predetermined values of segmentation length information.

2. (Previously Presented) The method of claim 1, wherein the special information includes indication whether the higher layer data unit ends in a current data segment or continues to a next lower level protocol data unit.

3. (Previously Presented) The method of claim 1, further comprising indicating with a predetermined value of the segmentation length information that the rest of the lower level

protocol data unit contains padding until a next segmentation length information or a next lower level protocol data unit contains padding.

4. (Previously Presented) The method of claim 1, further comprising indicating with the segmentation length information an exact point in the end of the lower layer protocol data unit that the higher layer data unit ends.

5. (Previously Presented) The method of claim 1, further comprising indicating with a predetermined value of the segmentation length information that the higher layer data unit carried in a current data segment continues to a next lower level protocol data unit.

6. (Currently Amended) A data segmentation method in a telecommunication system, comprising:

segmenting larger data units of a higher layer into smaller protocol data units of a lower layer so that each at least one lower layer protocol data unit includes ~~one~~ two or more data segments ~~each containing data from two or more~~ a different ~~one of~~ the upper layer data units;

~~providing each lower layer protocol data that contains two or more data segments from two or more different higher layer data units, with segmentation length information which otherwise indicates length of the data segments;~~

indicating with predetermined values of the segmentation length information special information about the higher level protocol data unit instead of the length of the segments that would be indicated in by other values of the segmentation length information, in each lower layer protocol data that contains two or more data segments from two or more different higher layer data units so that the segmented higher level data unit can be assembled at a receiving end by means of the predetermined values of the segmentation length information; and

providing no segmentation information in a lower layer protocol data unit which contains data only from a single one of the higher layer data units and no padding.

7. (Previously Presented) The method of claim 1, further comprising providing segmentation information in a lower layer protocol data unit which contains data only from a single one of the higher layer data units and padding.

8. (Currently Amended) A data segmentation method in a telecommunications system, comprising:

segmenting larger data units of a higher layer into smaller protocol data units of a lower layer so that ~~each~~ at least one lower layer protocol data unit includes ~~one~~ two or more data segments ~~each containing data from a~~ two or more different ~~one of the~~ higher layer units;

~~providing each lower layer protocol data unit that contains two or more data segments from two or more different higher layer data units, with segmentation length information which otherwise indicates length of the data segments;~~

indicating with predetermined values of the segmentation length information special information about the higher layer data unit, instead of the length of the segments that would be indicated by other values of the segmentation length information, in each lower layer protocol data that contains two or more data segments from two or more different higher layer data units so that the segmented higher level data unit can be assembled at a receiving end by means of the predetermined values of the segmentation length information;

providing each lower level protocol data unit with two or more payload units of a predetermined length, the payload units being a smallest unit in a retransmission protocol employed;

carrying the segmented higher layer data units in the payload units;

providing a segmentation indicator field in a beginning of one or more of the payload units in the lower level protocol data unit, if required; and

indicating in a header of the lower layer protocol data unit which one or ones, if any, of the payload units contain the segmentation length information.

9. (Previously Presented) The method of claim 8, further comprising providing a segmentation indicator field in a beginning of a first one of the payload units for indicating segmentation information for all segments in the lower level protocol data unit, if required.

10. (Currently Amended) A telecommunications system, comprising:

an upper protocol layer including upper layer data units;

a lower protocol layer including protocol data units having a payload size smaller than the upper layer data units;

means for segmenting the upper layer data units for insertion into smaller protocol data units of a lower layer so that ~~each~~ at least one lower layer protocol data unit includes ~~one~~ two or more data segments, ~~each containing data from a~~ two or more different ~~one of the~~ upper layer data units;

~~means for inserting segmentation length information which indicates length of the data segments at least in each lower layer protocol data unit that contains two or more data segments from two or more different upper layer data units;~~

means for providing a predetermined value in ~~the~~ segmentation length information to a receiver, the predetermined value including special information about the upper layer data units instead of the length of the data segments that would be indicated by other values of the segmentation length information at least in each lower layer protocol data unit that contains two or more data segments from two or more different upper layer data units so as to enable assembling the segmented upper layer data units from received lower layer protocol data units at a receiver by means of the predetermined values of the segmentation length information in the lower layer protocol data units.

11. (Previously Presented) The system of claim 10, further comprising a predetermined value of the segmentation length information indicating to the receiver that a rest of the lower level protocol data unit contains no padding until a next segmentation length information or a next lower level protocol data unit contains padding.

12. (Previously Presented) The system of claim 10, further comprising a predetermined value of the segmentation length information indicating to the receiver that the higher layer data unit carried in the current data segment continues to a next lower level protocol data unit.

13. (Previously Presented) The system of claim 10, wherein the segmentation length information points exactly to an end of the lower layer protocol data unit where the higher layer data unit ends.

14. (Currently Amended) A telecommunications system, comprising:

an upper protocol layer including upper layer data units;

a lower protocol layer including protocol data units having a payload size smaller than the upper layer data units;

means for segmenting the upper layer data units for insertion into smaller protocol data units of a lower layer so that ~~each~~ at least one lower layer protocol data unit includes ~~one~~ two or more data segments ~~each containing data from a~~ two or more different ~~one of the~~ upper layer data units;

~~means for inserting segmentation length information which indicates length of the data segments at least in each lower layer protocol data unit that contains two or more data segments from two or more different upper layer data units;~~

means for providing a predetermined value in the segmentation length information to a receiver, the predetermined value including special information about the upper layer data units, instead of the length of the data segments that would be indicated by other values of the segmentation length information, in each lower layer protocol data unit that contains two or more data segments from two or more different upper layer data units so as to enable assembling of the segmented upper layer data units from received lower layer protocol data units at a receiver by means of the special values of the segmentation length information in the lower layer protocol data units;

two or more payload units of a predetermined length in each lower level protocol data unit, with two or more payload units of a predetermined length for carrying the segmented upper layer data units, the payload unit being a smallest unit in a retransmission protocol employed;

a segmentation indicator field in a beginning of one or more of the payload units in the lower level protocol data unit, if required; and

at least one indicator in a header of the lower layer protocol data unit for indicating which one or ones, if any, of the payload units contain the segmentation length information.

15. (Currently Amended) A data segmentation method in a telecommunication system, comprising:

segmenting larger first data units of a higher protocol layer into data segments that can be accommodated by smaller second data units of a lower protocol layer, ~~each~~ at least one second data unit comprising ~~one~~ two or more data segments, ~~each data segment containing data from a~~ two or more different ~~one of the~~ first data units;

~~providing the second data units with segmentation length information when the second data unit contains two or more data segments carrying data from two or more first data units;~~

indicating with predetermined values of ~~the~~ segmentation length information special information about the first data units, instead of the length of the data segments that would be indicated by other values of said segmentation length information ~~other than said predetermined values indicating the length of the data segments;~~

transmitting the second data units to a receiving end; and

assembling the first data units from the received second data units at the receiving end by means of the special values of the segmentation length information.

16. (Currently Amended) A telecommunications system, comprising:

an upper protocol layer including first data units;

a lower protocol layer including second data unit having a payload size smaller than said first data units;

means for segmenting said first data units into data segments that can be accommodated by the second data units for insertion into the second data units, ~~each~~ at least one second data unit comprising ~~one~~ two or more data segments, ~~each data segment containing data from a two or more~~ different one of the first data units;

~~means for inserting a segmentation length information in the second data units when the second data unit contains data from two or more of the first data units; and~~

means for giving a predetermined value in ~~the~~ segmentation length information in order to provide a receiver with special information about the first data units, in place of the length of the data segments that would be indicated by other values of said segmentation length information ~~other than said predetermined values indicating the length of the data segments~~, in each second data unit that contains data from two or more different first layer data units so as to enable assembling the segmented first data unit from received second data units at a receiver by means of the predetermined values of the segmentation length information in said second data units.

17. (Currently Amended) A mobile station, comprising:

a processor in the mobile station, said processor being configured to:

support an upper protocol layer including first data units;

~~the mobile station being configured to support a lower protocol layer including second data unit having a payload size smaller than said first data units;~~

~~the mobile station being configured to segment said first data units into data segments that can be accommodated by the second data units for insertion into the second data units, each second data unit including one or more data segments, and at least one second data unit including two or more data segments from two or more different first data units; and~~

~~the mobile station being configured to insert a segmentation length information in the second data unit when the second data unit contains data from two or more of the first data units;~~

~~the mobile station being configured to set a predetermined value for the segmentation length information in order to provide a receiver with special information about the first data units, instead of the length of the data segments that would be indicated by other values of said segmentation length information other than said predetermined values indicating the length of the data segments, in each second data unit that contains data from two or more different first layer data units so as to enable a receiver to assemble the segmented first data unit from received second data units by means of the predetermined values of the segmentation length information included in said second data units.~~

18. (Currently Amended) A mobile station, comprising:

~~the mobile station a processor, said processor being configured to:~~

support an upper protocol layer including first data units;

~~the mobile station being configured to support a lower protocol layer including second data unit having a payload size smaller than said first data units;~~

~~the mobile station being configured to segment said first data units into data segments that can be accommodated by the second data units for insertion into the second data units, each at least one second data unit including one two or more data segments from two or more different first data units;~~

~~the mobile station being configured to insert a segmentation length information in the second data unit when the second data unit contains data from two or more of the first data units;~~
~~the mobile station being configured to~~

set a predetermined value for the segmentation length information in order to provide a receiver with special information about the first data units, in place of other values of said segmentation length information other than said predetermined values indicating that would indicate the length of the data segments, in each second data unit that contains data from two or

more different first layer data units so as to enable a receiver to assemble the segmented first data unit from received second data units at the receiver ~~by means of~~ using the predetermined values of the segmentation length information included in said second data units;

two or more payload units of a predetermined length in each second data unit, with two or more payload units of a predetermined length for carrying the segmented first data units, the payload unit being a smallest unit in a retransmission protocol employed;

a segmentation indicator field in a beginning of one or more of the payload units in the second data unit, if required; and

at least one indicator in a header of the second data unit for indicating which one or ones, if any, of the payload units contain the segmentation length information.

19. (Currently Amended) A network element, comprising:

~~the network element~~ a processor, said processor being configured to:

support an upper protocol layer including first data units;

~~the network element being configured to support a lower protocol layer including second data unit having a payload size smaller than said first data units;~~

~~the network element being configured to segment said first data units into data segments that can be accommodated by the second data units for insertion into the second data units, each~~ at least one second data unit including one two or more data segments from two or more different first data units;

~~the network element being configured to insert a segmentation length information in the second data unit when the second data unit contains data from two or more of the first data units;~~

~~the network element being configured to set a predetermined value for the segmentation length information in order to provide a receiver with special information about the first data units at least in each lower layer protocol data unit containing two or more data segments carrying data from two or more different first data units, in place of the length the data segments~~

that would be indicated by other values of said segmentation length information ~~other than said predetermined values indicating the length of the data segments~~ so as to enable a receiver to assemble the segmented first data unit from received second data units at the receiver by means of the predetermined values of the segmentation length information included in said second data units.

20. (Currently Amended) A network element, comprising:

~~the network element~~ a processor, said processor being configured to:

support an upper protocol layer including first data units;

~~the network element being configured to~~ support a lower protocol layer including second data unit having a payload size smaller than said first data units;

~~the network element being configured to~~ segment said first data units into data segments that can be accommodated by the second data units for insertion into the second data units, ~~each~~ at least one second data unit including ~~one~~ two or more data segments from two or more different first data units;

~~the network element being configured to~~ insert a segmentation length information in the second data unit when the second data unit contains data from two or more of the first data units;

~~the network element being configured to~~ set a predetermined value for the segmentation length information in order to provide a receiver with special information about the first data units, instead of other values of said segmentation length information ~~other than said predetermined values indicating~~ that would indicate the length of the data segments in each second data unit that contains data from two or more different first layer data units so as to enable a receiver to assemble the segmented first data unit from received second data units at the receiver by means of the predetermined values of the segmentation length information included in said second data units;

two or more payload units of a predetermined length in each second data unit, with two or more payload units of a predetermined length for carrying the segmented first data units, the payload unit being a smaller unit in a retransmission protocol employed;

a segmentation indicator field in a beginning of one or more of the payload units in the second data unit, if required; and

at least one indicator in a header of the second data unit for indicating which one or ones, if any, of the payload units contain the segmentation length information.

21. (Currently Amended) An apparatus, comprising:

a data segmentation unit configured to segment larger data units of a higher layer into smaller protocol data units of a lower layer, at least one ~~so that each~~ lower layer protocol data unit ~~includes~~ including two or more data segments ~~each containing data from two or more~~ a different ~~one of the~~ upper layer data units;

said data segmentation unit being configured to insert in a lower layer protocol data unit containing two or more data segments from two or more different higher layer data units, segmentation length information having one of predetermined values which, instead of the length of the segments that would be indicated by other values of the segmentation length information, indicates other special information about said two or more different higher layer data units segmented into the respective lower layer data unit, so as to enable to associate each of said two or more data segments in said lower layer protocol data unit with an appropriate one of said two or more different higher layer data units when assembling the segmented higher level data unit at a receiving end.

22. (Currently amended) An apparatus of claim 21, wherein the special information ~~includes~~ comprises an indication of whether the higher layer data unit ends in a current data segment or continues to a next lower level protocol data unit.

23. (Previously Presented) An apparatus of claim 21, wherein a predetermined value of the segmentation length information indicates that the rest of the lower level protocol data unit

contains padding until a next segmentation length information or a next lower level protocol data unit contains padding.

24. (Previously Presented) An apparatus of claim 21, wherein the special information indicates an exact point in the end of the lower layer protocol data unit that the higher layer data unit ends.

25. (Previously Presented) An apparatus of claim 21, wherein a predetermined value of the segmentation length information indicates that the higher layer data unit carried in a current data segment continues to a next lower level protocol data unit.

26. (Currently Amended) An apparatus, comprising:

data desegmentation unit configured to assemble larger data units of a higher layer from data segments received in smaller protocol data units of a lower protocol layer, ~~each~~ at least one received lower layer protocol data unit including ~~one~~ two or more data segments ~~each containing data from~~ two or more different ~~one of the~~ higher layer data units;

said data desegmentation unit being configured to extract, from a lower layer protocol data unit containing two or more data segments from two or more different higher layer data units, segmentation length information having one of predetermined values which, instead of the length of the segments that would be indicated by other values of the segmentation length information, indicate other special information about said two or more different higher layer data units segmented into the respective lower layer data unit, so as to associate each of said two or more data segments in said lower layer protocol data unit with an appropriate one of said two or more different higher layer data units when assembling the segmented higher level data unit.

27. (Currently amended) An apparatus of claim 26, wherein the special information ~~includes~~ comprises an indication of whether the higher layer data unit ends in a current data segment or continues to a next lower level protocol data unit.

28. (Currently amended) An apparatus of claim 26, wherein a predetermined value of the segmentation length information indicates that ~~he~~ the rest of the lower level protocol data

unit contains padding until a next segmentation length information or a next lower level protocol data unit contains padding.

29. (Previously Presented) An apparatus of claim 26, wherein the special information indicates an exact point in the end of the lower layer protocol data unit that the higher layer data unit ends.

30. (Previously Presented) An apparatus of claim 26, wherein a predetermined value of the segmentation length information indicates that the higher layer data unit carried in a current data segment continues to a next lower level protocol data unit.